AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A light diffusing plate comprising:

a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate, into which collimated light is launched;

a plurality of light exit areas disposed on another surface of said lens substrate, from which diffused light is issued, each having a circular form a center of which is coincident with an optical axis of each of said plurality of microlenses; ~~and~~

a light shield layer formed on said another surface of the lens substrate reverse to said plurality of microlenses, and covering other area than said plurality of light exit areas~~,~~; and

an anti-reflective layer formed on a surface of said light shield layer other than a surface formed on said light shield layer and covering the other area than said plurality of light exit areas,

wherein when a refractive index of said lens substrate is represented by n; a thickness of said lens substrate by t; a diameter of each of said plurality of light exit areas by R; and a size of each of said plurality of microlenses by Sr, the following formula is satisfied:

$Sr \geq 2t \times \tan\theta + R$ (with the proviso that $\theta = \sin^{-1}(1/n)$).

2. (original): The light diffusing plate according to claim 1, wherein said plurality of microlenses are either in circular form when viewed from a direction of the optical axis and are arranged in a closest packing state or in hexagonal form when viewed from the direction of the optical axis and are arranged in a hexagonal close-packed state.

Claim 3 (canceled).

4. (original): The light diffusing plate according to claim 1, wherein said refractive index of said lens substrate is between 1.4 and 2.

5. (currently amended): A liquid crystal display apparatus comprising:

a liquid crystal display panel;

a backlight section for causing ~~a~~ collimated light to be incident on said liquid crystal display panel; and

a light diffusing plate for diffusing ~~an~~ image-bearing collimated light which has passed through said liquid crystal display panel,

wherein said light diffusing plate comprises a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate, into which said image-bearing collimated light is launched;

a plurality of light exit areas disposed on another surface of said lens substrate, from which diffused light to display an image is issued, each having a circular form a center of which is coincident with an optical axis of each of said plurality of microlenses; ~~and~~

a light shield layer formed on said another surface of the lens substrate reverse to said plurality of microlenses, and covering other area than said plurality of light exit areas~~,~~; and

an anti-reflective layer formed on a surface of said light shield layer other than a surface formed on said light shield layer and covering the other area than said plurality of light exit areas,

wherein when a refractive index of said lens substrate is represented by n; a thickness of said lens substrate by t; a diameter of each of said plurality of light exit areas by R; and a size of each of said plurality of microlenses by Sr, the following formula is satisfied:

$Sr \geq 2t \times \tan\theta + R$ (with the proviso that $\theta = \sin^{-1}(1/n)$).

6. (currently amended): A rear projection apparatus comprising:

a rear projection engine for issuing ~~an~~ image-bearing diffused light; and

a screen on which the image-bearing diffused light is incident and an image of the image-bearing diffused light is displayed, said screen including:

a Fresnel lens by which said image-bearing diffused light issued from said rear projection engine is changed into image-bearing collimated light; and

a light diffusing plate for diffusing said image-bearing collimated light from said Fresnel lens,

wherein said light diffusing plate comprises:

a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate, into which said image-bearing collimated light is launched;

a plurality of light exit areas disposed on another surface of said lens substrate, from which diffused light to display an image is issued, each having a circular form a center of which is coincident with an optical axis of each of said plurality of microlenses; ~~and~~

a light shield layer formed on said another surface of the lens substrate reverse to said plurality of microlenses, and covering other area than said plurality of light exit areas~~,~~; and

an anti-reflective layer formed on a surface of said light shield layer other than a surface formed on said light shield layer and covering the other area than said plurality of light exit areas,

wherein when a refractive index of said lens substrate is represented by n; a thickness of said lens substrate by t; a diameter of each of said plurality of light exit areas by R; and a size of each of said plurality of microlenses by Sr, the following formula is satisfied:

$Sr \geq 2t \times \tan\theta + R$ (with the proviso that $\theta = \sin^{-1}(1/n)$).

7. (withdrawn): A light diffusing plate comprising:

a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light exit areas each having a rectangular form a center of which is coincident with an optical axis of each of said plurality of microlenses; and

a light shield layer formed on another surface of the lens substrate reverse to said plurality of microlenses, and covering other area than said plurality of light exit areas,

wherein, when a refractive index of said lens substrate is represented by n; a thickness of said lens substrate by t; a length of a side of each of said plurality of light exit areas by A; a length of another side of each of said plurality of light exit area by B; a size of each of said plurality of microlenses in a direction of said length A represented by Sa; and a size of each of said plurality of microlenses in a direction of said length B represented by Sb, the following formulae are satisfied:

$Sa \geq 2t \times \tan\theta + A$

$Sb \geq 2t \times \tan\theta + B$ (with the proviso that $\theta = \sin^{-1}(1/n)$).

8. (withdrawn): The light diffusing plate according to claim 7,

wherein said plurality of microlenses are either in square form viewed from a direction of the optical axis and are arranged in a square closed-packed state or in rectangular form viewed from the direction of the optical axis and are arranged in a rectangular closed-packed state.

9. (withdrawn): The light diffusing plate according to claim 7, further comprising an anti-reflective layer formed at a light exit side than said light shield layer, and covering other area than said plurality of light exit areas.

10. (withdrawn): The light diffusing plate according to claim 7, wherein the refractive index of said lens substrate is between 1.4 and 2.

11. (withdrawn): A liquid crystal display apparatus comprising:

a liquid crystal display panel;

a backlight section for causing a collimated light to be incident on said liquid crystal display panel; and

a light diffusing plate for diffusing an image-bearing collimated light which has passed through said liquid crystal display panel,

wherein said light diffusing plate comprises a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light exit areas each having a rectangular form a center of which is coincident with an optical axis of each of said plurality of microlenses; and

a light shield layer formed on another surface of the lens substrate reverse to avoid plurality of microlenses, and covering other area than said plurality of light exit areas,

wherein, when a refractive index of said lens substrate is represented by n; a thickness of said lens substrate by t; a length of a side of each of said plurality of light exit areas by A; a length of another side of each of said plurality of light exit area by B; a size of each of said plurality of microlenses in a direction of said length A represented by Sa; and a size of each of

said plurality of microlenses in a direction of said length B represented by Sb, the following formulae are satisfied:

$Sa \geq 2t \times \tan\theta + A$

$Sb \geq 2t \times \tan\theta + B$ (with the proviso that $\theta = \sin^{-1}(1/n)$).

12. (withdrawn): A rear projection apparatus comprising a rear projection engine for issuing an image-bearing diffused light and a screen on which the image-bearing diffused light is incident and an image of the image-bearing diffused light is displayed, said screen including a Fresnel lens and a light diffusing plate,

wherein said light diffusing plate comprises a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light exit areas each having a rectangular form a center of which is coincident with an optical axis of each of said plurality of microlenses; and

a light shield layer formed on another surface of the lens substrate reverse to avoid plurality of microlenses, and covering other area than said plurality of light exit areas,

wherein, when a refractive index of said lens substrate is represented by n; a thickness of said lens substrate by t; a length of a side of each of said plurality of light exit areas by A; a length of another side of each of said plurality of light exit area by B; a size of each of said plurality of microlenses in a direction of said length A represented by Sa; and a size of each of said plurality of microlenses in a direction of said length B represented by Sb, the following formulae are satisfied:

$Sa \geq 2t \times \tan\theta + A$

$Sb \geq 2t \times \tan\theta + B$ (with the proviso that $\theta = \sin^{-1}(1/n)$).

13. (withdrawn): A light diffusing plate comprising:

a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light exit areas disposed on another surface of said lens substrate reverse to said plurality of microlenses, and having an optical axis of each of said plurality of microlenses; and

a light shield layer formed on said another surface of the lens substrate reverse to said plurality of microlenses, and covering other area than said plurality of light exit areas,

wherein a form of each of said plurality of microlenses is a part of an ellipsoid shown in the following formula (1),

wherein an accentricity ε of said ellipsoid is shown in the following formula (2) and

wherein, in said ellipsoid, a focal point away from a side into which light is launched is coincident with a position of each of said plurality of light exit areas:

$$X2/a2 + y2/a2 + z2/c2 = 1 \quad (1)$$

$$\varepsilon = (c2 - a2)1/2/c = 1/n \quad (2)$$

wherein x and y represent axis on the surface of the lens substrate; z represents the optical axis; and n represents a refractive index of a material forming said plurality of microlenses.

14. (withdrawn): The light diffusing plate according to claim 13, wherein said plurality of microlenses are either in circular form viewed from a direction of the optical axis and are arranged in a closest packing state, or in hexagonal form viewed from the direction of the optical axis and are arranged in a hexagonal close-packed state.

15. (withdrawn): The light diffusing plate according to claim 13, further comprising an anti-reflective layer formed on a light exit side, and covering an area other than said plurality of light exit areas.

16. (withdrawn): The light diffusing plate according to claim 13, wherein the refractive index of said lens substrate is between 1.4 and 2.

17. (withdrawn): A liquid crystal display apparatus comprising:

a liquid crystal display panel;

a backlight section for causing a collimated light to be incident on said liquid crystal display panel; and

a light diffusing plate for diffusing an image-bearing collimated light which has passed through said liquid crystal display panel,

wherein said light diffusing plate comprises a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light exit areas disposed on another surface of said lens substrate reverse to said plurality of microlenses, and having an optical axis of each of said plurality of microlenses; and

a light shield layer formed on said another surface of the lens substrate reverse to said plurality of microlenses, and covering other area than said plurality of light exit areas,

wherein a form of each of said plurality of microlenses is a part of an ellipsoid shown in the following formula (1),

wherein an accentricity ε of said ellipsoid is shown in the following formula (2) and

wherein, in said ellipsoid, a focal point away from a side into which light is launched is coincident with a position of each of said plurality of light exit areas:

$$X^2/a^2 + y^2/a^2 + z^2/c^2 = 1 \qquad (1)$$

$$\varepsilon = (c^2 - a^2)^{1/2}/c = 1/n \qquad (2)$$

wherein x and y represent axis on the surface of the lens substrate; z represents the optical axis; and n represents a refractive index of a material forming said plurality of microlenses.

18. (withdrawn): A rear projection apparatus comprising a rear projection engine for issuing an image-bearing diffused light and a screen on which the image-bearing diffused light is incident and an image of the image-bearing diffused light is displayed, said screen including a Fresnel lens and a light diffusing plate,

wherein said light diffusing plate comprises a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light exit areas disposed on another surface of said lens substrate reverse to said plurality of microlenses, and having an optical axis of each of said plurality of microlenses; and

a light shield layer formed on said another surface of the lens substrate reverse to said plurality of microlenses, and covering other area than said plurality of light exit areas,

wherein a form of each of said plurality of microlenses is a part of an ellipsoid shown in the following formula (1),

wherein an accentricity ε of said ellipsoid is shown in the following formula (2) and

wherein, in said ellipsoid, a focal point away from a side into which light is launched is coincident with a position of each of said plurality of light exit areas:

$$X^2/a^2 + y^2/a^2 + z^2/c^2 = 1 \quad (1)$$

$$\varepsilon = (c^2 - a^2)^{1/2}/c = 1/n \quad (2)$$

wherein x and y represent axis on the surface of the lens substrate; z represents the optical axis; and n represents a refractive index of a material forming said plurality of microlenses.

19. (new): The light diffusing plate according to claim 1, further comprising a plurality of protrusions provided on a side of said another surface of said lens substrate, wherein an end surface of each of said plurality of protrusions becomes each of said plurality of light exit areas.

20. (new): The light diffusing plate according to claim 19, wherein said light shield layer and said anti-reflective layer are embedded among said plurality of protrusions.

21. (new): The liquid crystal display apparatus according to claim 5, wherein said backlight section comprises:

at least one light source;

a lamp housing for containing said at least one light source, whose inner surfaces are covered with a diffuse reflecting layer; and

a collimating plate which comprises:

a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate, from which said collimated light is issued;

a plurality of light entrance areas disposed on another surface of said lens substrate, into which light issued from said at least one light source and reflected by the inner surfaces of said lamp housing is launched, each having a circular form a center of which is on an optical axis of each of said plurality of microlenses and set on said another surface of the lens substrate reverse to said plurality of microlenses;

a light shield layer formed on said another surface of said lens substrate reverse to said plurality of microlenses so as to cover other area than said plurality of light entrance areas; and

a diffuse reflecting layer formed at a light entrance side than said light shield layer so as to cover other area than said plurality of light entrance areas.

22. (new): A light diffusing plate comprising:

a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light exit areas, each having a circular form a center of which is coincident with an optical axis of each of said plurality of microlenses;

a plurality of protrusions provided on a side of another surface of said lens substrate reverse to said plurality of microlenses, each end surface of said plurality of protrusions becoming each of said plurality of light exit areas; and

a light shield layer formed on said another surface of the lens substrate and embedded among said plurality of protrusions, said light shield layer covering other area than said plurality of light exit areas,

wherein when a refractive index of said lens substrate is represented by n; a thickness of said lens substrate by t; a diameter of each of said plurality of light exit areas by R; and a size of each of said plurality of microlenses by Sr, the following formula is satisfied:

$Sr \geq 2t \times \tan\theta + R$ (with the proviso that $\theta = \sin^{-1}(1/n)$).

23. (new): The light diffusing plate according to claim 22, wherein said plurality of microlenses are either in circular form when viewed from a direction of the optical axis and are arranged in a closest packing state or in hexagonal form when viewed from the direction of the optical axis and are arranged in a hexagonal close-packed state.

24. (new): The light diffusing plate according to claim 22, further comprising

an anti-reflective layer formed on a surface of said light shield layer other than a surface formed on said light shield layer and covering the other area than said plurality of light exit areas.

25. (new): The light diffusing plate according to claim 24, wherein said anti-reflective layer is embedded among said plurality of protrusions.

26. (new): The light diffusing plate according to claim 22, wherein said refractive index of said lens substrate is between 1.4 and 2.

27. (new): A light diffusing plate comprising:

a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate, into which collimated light is launched;

a plurality of light exit areas disposed on another surface of said lens substrate, from which diffused light is issued, each having a circular form a center of which is coincident with an optical axis of each of said plurality of microlenses;

a light shield layer formed on said another surface of the lens substrate reverse to said plurality of microlenses, and covering other area than said plurality of light exit areas; and

an anti-reflective layer formed on a surface of said light shield layer other than a surface formed on said light shield layer and covering the other area than said plurality of light exit areas.

28. (new): The light diffusing plate according to claim 27, further comprising a plurality of protrusions provided on a side of said another surface of said lens substrate, wherein an end surface of each of said plurality of protrusions becomes each of said plurality of light exit areas.

29. (new): The light diffusing plate according to claim 28, wherein said light shield layer and said anti-reflective layer are embedded among said plurality of protrusions.

30. (new): A light diffusing plate comprising:

a lens substrate;

a plurality of microlenses disposed on a surface of said lens substrate;

a plurality of light exit areas, each having a circular form a center of which is coincident with an optical axis of each of said plurality of microlenses;

a plurality of protrusions provided on a side of another surface of said lens substrate reverse to said plurality of microlenses, each end surface of said plurality of protrusions becoming each of said plurality of light exit areas; and

a light shield layer formed on said another surface of the lens substrate and embedded among said plurality of protrusions, said light shield layer covering other area than said plurality of light exit areas.